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Incoming master's students in the University of North Carolina Chapel Hill School of Information and Library Science have the opportunity to take a three-part online test to complete their Information Technology Competency Requirement. While the test encourages students to teach themselves the skills, use outside resources, and continue to resubmit until they pass the exam, there are few updated resources available to assist with the process. This project created an online learning module that provides students with self-guided lessons and external resources in order to help them learn the skills necessary to pass the test. The overarching goal of the project was to lower the barrier of entry for incoming master's students to teach themselves technology skills and improve their digital literacy.

Headings:

Online education

Distance learning

Heuristics

Computer literacy

Information technology

Information technology education

LOWERING THE BARRIER OF ENTRY: DEVELOPING AN ONLINE SELF-GUIDED LEARNING MODULE FOR AN INFORMATION TECHNOLOGY COMPETENCY TEST

by
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Introduction

The University of North Carolina at Chapel Hill School of Information and Library Science (SILS) requires incoming master's students to meet an Information Technology Competency Requirement. These students must either pass a three-part, online test or enroll in a three-credit course at SILS that does not count towards the credits needed to complete the master's degree. This system encourages students to take the test in the summer before their first year of graduate school and completing the exam by teaching themselves new skills, using outside resources, and continuing to resubmit until they pass.

While the test offers relative flexibility in using outside materials to guide yourself through the test, the school does not provide a dedicated study guide for navigating the requirements of the test or for the concepts tested. In order to lower the barrier to entry to learn these technology skills and help students navigate the wide range of resources that could assist with teaching oneself new skills, I created an online, structured learning module that provides self-guided instruction for the skills required to pass the Information Technology Competency Test (found at infotechstudyguide.web.unc.edu)

The guide provides students with lessons and external resources in order to help them learn the skills necessary to pass the test and instill confidence in their ability to continue to learn technology skills while in graduate school. In order to incorporate an

IDEA (inclusion, diversity, equity, and accessibility) framework into the design, I collaborated to include the research of another SILS master's student who performed a content analysis on resources for evaluating the readability, accessibility, and diversity of learning approaches in online learning resources. Using the external resources from the test and the guide, she provided overarching recommendations on how to include or supplement such resources in the final deliverable. The overarching goal of the project was to lower the barrier of entry for incoming master's students to teach themselves technology skills and improve digital literacy.

Context

Setting

This project was completed for the University of North Carolina at Chapel Hill's School of Information and Library Science (SILS), a highly respected, ALA accredited information school focused on information theory and providing practical work experience ("Quick facts," 2019; "UNC School of Information and Library Science," 2018). The school offers several degree programs: an undergraduate major and minor in Information Science, a M.S. in Library Science, a M.S. in Information Science, a PhD program, and several professional degrees and certifications.

As of spring 2019, there were 248 graduate students enrolled ("Quick facts," 2019). Within that population, this project considers master's students studying Library Science or Information Science the group that would most benefit from the guide. These students come from a variety of backgrounds, educations, states, and countries, so some students enter the school far more comfortable with technology than others. Some students are studying non-technical areas of Information and Library Science, and will not enter the school with prior knowledge of the skills necessary to pass the test. The self-guided module was developed as an additional resource to support the Information Technology Competency Test, which is a core requirement for all master's students in the program, regardless of their track or concentration.

To remain a leading information school and uphold stated values that center around innovation and information management, the school's required curriculum includes several technology components. SILS has a stake in the success of this project because the guide could help better prepare students to work with technology, show their competency, and begin their program with a better idea of the school's expectations. In fact, this project falls in line with one of the core values stated in the SILS Strategic Plan for 2012 – 2020; "Self-directed learning" is an important tenet of the school pedagogically and also as a part of the library and information world ("SILS 2012-2020," 2012). SILS has an interest in the project because the guide could have a positive impact on their students and on their test results. The quality and accessibility of resources available to perspective students reflects on the mission and quality of the school.

The learning module is set to be linked from the SILS website on the page where students are directed to download the test materials. This location was chosen with the hope that incoming students will find the link to the test itself and to the self-guided learning module in the same place. This will streamline the studying process for these students, make it clear that they can use outside help to learn the material, and show that SILS is dedicated to providing accessible resources to support its students.

Information Competency Requirement

The Information Technology Competency Test is offered to SILS master's students as a way to fulfill the Information Technology Competency Requirement, and once passed, takes the place of a 3-credit course titled "INLS 161: Tools for Information Literacy." This course is technically on the undergraduate level, so the credits earned in the course cannot be applied to a master's degree ("Information technology," n.d.). This

means that some students that meet the requirement by taking the class add an additional class on top of the usual four classes expected every semester at SILS, typically in their first semester of the graduate program. For this reason, students are encouraged to take the test in the months before they begin their program rather than take the class in their first semester.

The test itself is a three-part exam that requires a variety of technology skills to create files that meet the requirements set forth in the test document. Students first download a PDF document that includes all of the instructions. Next, they complete each portion of the test, saving each question's response as a separate file, and finally email the completed test to a person to grade. Each section of the test requires different technology, software, or knowledge, and the test is structured to build on itself. For example, the last section of the test requires students to create a web page that includes links to the other files they created. The test can be retaken as many times as necessary before the due date, which is set as just before the semester the student will begin classes ("Information technology," n.d.). The instructions for the test encourage students to use the internet, read through past syllabi from the in-person course, and requests that if the test is not passed on the first try to "please teach yourself the knowledge you need" ("Information technology," n.d.). The test is structured as a learning experience and expects that students will be able to propel their own learning and pass the test on their own. This project supports that goal by creating a module that purposefully guides students through the self-teaching model and help them find appropriate places to search and find accurate information.

Problem

Area of Need

SILS students may struggle with the test because they feel intimidated by the technology, confused about the contents, or lack self-guided resources to help them learn new concepts. While there are some resources provided to help with the test, including syllabi from past iterations of the full-length class, they are not specifically designed with self-guided learning in mind. Digital literacy will vary between students, meaning that some will require assistance with every part of the test while some only need to teach themselves a few concepts. Such variation requires that a learning module be self-guided and organized in a way that it is non-linear and can be divided into individual concepts. The digital divide between those with prior technology knowledge and those without predominately favors white, affluent, non-disabled students, which means that those without such advantages are expected to take on additional burden to "catch up" with learning technology and guiding their education (Ercikan, Asil, & Grover, 2018). Ignoring this disparity could cause further equity issues in the school as well as in technology-related professions and areas of study, opening up the potential to continue excluding people of color, people with disabilities, and students with a lower income level. The guide supporting the Information Technology Competency Test is an opportunity to take steps to support digital literacy for those without the privileges mentioned above (Ercikan, Asil, & Grover, 2018). In this light, the test was designed to

be as readable, accessible, and conducive to a diverse set of learning needs as possible to attempt to meet the full area of need in the SILS population.

Based on my experience, the air of mystery surrounding the test and its requirements has persisted because of the limited resources available to help students address the concepts in the test. The past syllabus directly provided as a learning resource was last updated in 2013, meaning that it seems outdated at a student's glance, and may be an overwhelming place to start because of the unwieldly amount of information provided ("Information technology," n.d.). The overarching problem is that the test is intimidating and may leave students unsure where to look for resources to teach themselves. This can be true whether they already have most of the basic knowledge to pass the test or are testing their capacity to learn technology skills for the first time. If students decide that the test is too difficult or not worth taking, then they add on a 3-credit course in their first semester; five classes is considered a high workload at SILS, and this level of rigor in a student's first semester may leave them overworked or feeling like they are trailing behind their peers. Some students decide that the class is the best way for them to learn these skills, and there are many positives to pursuing technology skills in that way. However, this project aims to prevent students from feeling as if they have no choice but to take the INLS 161 class, and works towards facilitating students teaching themselves the concepts necessary to pass the test in order to increase confidence with technology.

Terms Defined

For the purpose of this project, I use these terms with the following definitions:

Online Learning Module: A guide hosted on the internet that intends to teach a skill or concept.

Structured Learning Module: A guide that teaches a skill or concept by dividing up teaching material into scaffolded sections in order to guide learning separately through individual parts of the overall idea.

Self-guided learning: Concerning a particular topic, development of knowledge that is not directly guided by an instructor, mentor, or facilitator but is instead regulated by the learner themselves.

Distance education: An academic pursuit that is offered away from the physical location of the associated campus or school, typically through online resources or a web-based learning management system.

Learning objects: Defined by Busetti, Emanuela, Dettori, Forcheri, and Ierardi as "chunks of self-consistent educational material suitable to be used as instructional components in a variety of contexts." (2007, p.3)

Online structured learning module: A website indented to teach a particular concept that has a clear navigation system including a uniform organization to each page, text, and lesson, with separate sections of the guide for each portion of the test.

Skills required to pass: In this Information Technology Competency Test, students need to be familiar with the following concepts to complete the tasks:

- Command line prompts
- Traceroutes
- Formatting within text processing applications
- Formatting within spreadsheet applications

- Writing formulas in spreadsheet applications
- Creating databases in a relational database application
- Hypertext Markup Language (HTML)
- Cascading Style Sheets (CSS)
- Combining HTML and CSS to create a basic web page

These skills include additional sub-skills required to complete the overall task; those abilities are included in the guide but are not listed here.

Related Work

The challenges, benefits and drawbacks in creating effective online learning materials have been acknowledged in similar projects and related literature. I have noted several areas of interest that pertain to this project and how they were addressed in other work.

Online Modules and Lessons

Librarians have always utilized technology to share information and provide learning resources, and online education is no different. Whether through classes, libguides, or targeted training models, educators are taking a critical look into best practices to making virtual classrooms and creating online learning modules. One of the overarching themes from this work highlights the importance of variety in e-learning tools. One of the affordances of online education is that you can provide a wealth of information in a variety of ways, which allows students to pick and choose what works best for them. Almost every project in this field mentions the need for providing information in more than one medium, both to meet a variety of learning approaches and to make the resources more accessible (Busetti, Dettori, Forcheri, & Ierardi, 2007; Dewald, 1999; Hess, 2013; McGuinness & Fulton, 2019; Sun, 2016). Providing instructions and materials in several formats has been noted as a best practice in in-person library instruction already, and Dewald notes specifically that online instruction is able to mimic face-to-face instruction and in some surpass it in this regard by providing multiple

mediums to meet students in their own learning space (1999). Providing many different avenues to learn the information allows students to choose their own path based on their own preferences and the situation they're faced with in context (Sun, 2016).

Further into the idea of providing variety in instruction is the idea of clear, modular, redundant navigation. Navigating the learning module is a key part of the experience, and could be a source of frustration if information is difficult to find or only located in one place (Hara & Kling, 2000). Choosing the right learning tool and then manipulating it to clearly show all of the options in a particular lesson is the first part of teaching remotely, especially to show students an overview of everything possible in the lesson before they decide on their own path (Dewald, 1999; Sun, 2016). Sitzmann et al. note that the first major step in self-regulation is forming a plan and deciding on goals, which is only possible if the student is aware of the possibilities open to them (2009, p. 700). Navigation also needs to be redundant and modular to make sure that students are able to choose their own path, and then find that path no matter where they are. Persistent navigation allows users to access the menus from anywhere on the site, but the menu shouldn't be the only way to find different pages, resources, and information. Each lesson or external resource should be able to be found from multiple avenues and from multiple places so that users can always find what they need, even if they don't follow a prescribed route through the information (Hess, 2013).

Also noted by similar projects creating online learning guides were positives and negatives of the online platform. The availability of audio, graphics, and interactive material was a major benefit for online learning (Dewald, 1999; McGuinness & Fulton, 2019). Using digital media was a thread that pulled together almost all of the work in this

area, and utilizing the affordances of the internet in combination with the lessons seems to be a strength. Negatives also stemmed from the digital components though, as technical difficulties and static content made it difficult to find help and cater content to specific needs in the material (Hess, 2013; Sacchanand & Jaroenpuntaruk, 2006). Without the flexibility of an in-person instruction who can answer questions and respond to the class's atmosphere, it's easy to become lost and frustrated with the material presented (Hara & Kling, 2000). The material needs to be flexible enough for editing on the back end of the project and to meet a variety of skill levels on the front end (Hess, 2013; Sacchanand & Jaroenpuntaruk, 2006).

The overall design of such online modules mimics the way a classroom would be set up: first give instruction, next model skills, then provide opportunities to apply those skills (Busetti et al., 2007, p. 8-9; Sacchanand & Jaroenpuntaruk, 2006). The difference for online learning is the need to break up information into small portions with minimal text and lots of interactivity to keep students engaged (Hess, 2013, p. 338; Busetti et al., 2007). One project at Oakland University Libraries laid out specific guidelines for their online module in the form of the acronym MAGIC, standing for "manageable, available, geared at users, informative, customizable" to ensure that they were creating content that caters to users and also worked specifically in a web format (Hess, 2013, p. 336-339). It was noted in a module concerning teaching robotics that for complicated and technical topics, "actual work on the real tool is crucial…" which brings up a common problem with applying skills taught through e-learning (Busetti et al., 2007, p. 2). The need for practical application is clear, but there are few viable solutions that can be applied pedagogically, especially in a project that does not require any synchronous learning.

Distance Education

Distance education itself offers a similar range of challenges with creating effective lessons of any kind. The benefits clearly noted by scholars and practitioners are the increased flexibility, control, and accessibility offered to students through self-guided online formats. This freedom for students allows a variety of potential setbacks to be worked around, such as schedules, locations, language barriers, and physical and mental disabilities (AIGheithy, 2015, p. 16; Fichten et al., 2009; Sacchanand & Jaroenpuntaruk, 2006, p. 511; Sun, 2016). However, these advantages are only viable if the course materials are designed in a thoughtful, accessible way, which takes time and care in many parts of the planning process (Sacchanand & Jaroenpuntaruk, 2006, p. 511; Wang, 2014, p. 355). Planning lessons for distance learning requires modification of lessons for an in-person class that allows students more possibility and modification of their own, including managing PDFs as test-readable, captions on videos, small chunks of information, and flexible timing and grading for assessment (Busetti et al., 2007, p. 3; Sun, 2016).

Studies note that remote education, e-learning objects, and online tutorials are best used in combination with in-person instruction (McGuinness & Fulton, 2019). While that isn't possible for this project, the core of the idea of blended learning is to have a support network, which is underlying purpose of the guide: to create a static support resource to help guide students with materials. Often the frustration and confusion associated with distance education has to do with learning new technologies, deciphering social cues virtually, and establishing trust within the learning environment (Hara &

Kling, 2000). These social problems are not an issue in this project since there is no synchronous or collaborative learning involved in studying for the test.

Accessible Education

Education, and certainly digital materials, need to be made accessible and usable by all students, which requires a knowledge of designing lessons and materials for a broad range of users (McGuinness & Fulton, 2019). Developing digital literacy is currently a major part of library work, and designing resources that are simple to use but also help to teach complicated topics is essential, especially for beginners. Learning new technologies can be overwhelming, and the best approach is to take each step on its own without overlapping concepts (Busetti et al., 2007, p. 13; Sitzmann, Bell, Kraiger & Kanar, 2009, p. 703). Learning one thing at a time is also easier with clear navigation and objectives set out ahead of you, and it has been pointed out that library instruction is most effective when it directly targets a class or assignment instead of teaching general concepts (Dewald, 1999, p. 26). This is a difficult balance between teaching exactly to the assignment or test at hand and providing a more general knowledge of concepts needed for the future (Dewald, 1999, p. 27). In most instances, active learning where students participate in the material and the practice is most effective for learners, which can be difficult in an online setting, but isn't impossible as an overarching goal (Dewald, 1999).

Teaching in an accessible way requires building trust and taking care with class materials and lessons so that they are possible to be used by all. Fichten et al. mention a few of the most common problems students with disabilities have with classroom materials that can keep them from accessing necessary materials (2009). PDF documents

should be created, converted or saved as OCR compliant and not as images, which cannot be searched or read by a screen reader. Similarly, videos should include a transcript for closed captions of any necessary audio included so that students have the option to listen, watch, and read the contents. Another concern that is tangential to this particular project is assessment techniques that have rigid time limits and little ability to work with the professor for alternate methods or timelines for testing (Fichten et al., 2009). This project, as should other e-learning object creation projects, follows national accessibility guidelines as well as institutional accessibility guides to create materials that are useful for all users.

This project to create a self-guided online learning module for graduate students takes into consideration how to design distance education lessons to meet accessibility requirements, how to best provide large amounts of complex information to beginning users, and how to facilitate the flexibility and modular nature of distance education. I strove to emulate the successes of past work in this area to create a guide that is clearly navigable for any chosen path and utilized digital media to enhance learning.

Scope and Procedures

Collaboration

This project worked in conjunction with another SILS master's student's research project to evaluate online learning resources and evaluation tools within an IDEA (inclusion, diversity, equity, and accessibility) framework. The external tutorials from the guide and the original test provided a sample of online learning resources for a content analysis that provided key insight into evaluation methods and usability concerns for these resources. Our direct collaboration was confined to the early stages of the project, as we developed evaluation guidelines and chose which resources would be best suited for the site. After we had a framework for recommendations, we consulted with each other but continued with two separate projects.

She evaluated each resource with the goal of providing recommendations concerning how evaluation tools and resources on the site address readability, accessibility, and compatibility with a variety of learning approaches. The data collected showed few patterns, but the process of creating guidelines for IDEA evaluation and diving into the methods of website creation led to valuable, overarching considerations for using equitable online resources. These recommendations informed my decision-making and how I structured the site itself to be more universally designed.

Overall, her research found that there is no simple way to algorithmically assess online resources, and even if there was a way, there is no way to create a resource that

would get a perfect score. None of these resources were created without human intervention, and where there is human input, there is human bias. A perfect resource looks different to different people, and would need different features depending on its purpose and use. More than anything, looking at accessibility and approachability of online resources emphasizes that variety and context are key. Presenting information in one way means that you won't be presenting it the best way for everyone, but it's not necessarily better to try and present it in every way all at once. Instead, several resources can work in conjunction to serve different purposes and meet needs that fit the guide more precisely. Learners are complex, and they can't be divided neatly into one track to learn; instead we can offer variety and a baseline of accessibility that benefits all. The guide's external resources try to take this into account by finding external sites that are as accessible as possible, but also by providing options and variations to as much content as possible. It will always be a work in progress, as needs and sites constantly change.

For automating evaluation, the results show the challenge in trying to standardize any kind of accessibility or pedagogical assessment for online resources. Simply because it is on the internet does not mean that it is easily parsed by an algorithm in a way that is comparable to a human judging its worth, and there are limitations to the tools that perform these assessments. Not only do different evaluation resources differ on results, but they are also not always transparent about how they assess material. For example, automated readability calculators parse the entire web page, and there is often no way to tell if the score is based on additional information, ads on the page, navigation, or a vocabulary list full of jargon that skews the score higher. Everyone has a different opinion of what is "readable" or not, and even choosing a standardized scale such as U.S.

Reading level may cause confusion for international users. Similarly, a page's accessibility may never be perfect according to an online assessment tool, but you can still evaluate the usefulness of the page based on what it tries to achieve and how accessible that content is.

Creating a matrix for scoring resources would be ideal, but ultimately the worth of a resource and its place within the guide is a decision based on context and purpose rather than in specific vocabulary or scores. The most important factor is to thoughtfully consider readability, differing learning approaches, and accessibility when creating content; what the "score" is in comparison to other sites isn't always a good measure of that effort. Every resource leans on context, and can be used thoughtfully within a page while acknowledging each resource's limits.

Implementation

Find Resources

The first step of the project's overall implementation was to identify the external resources I would use in the project to guide students to learning tools. These resources are entirely online so that it is easy to find them linked from the primary learning guide. They act as supplementary, or sometimes primary, materials to teach about each topic on the test, and include different types of media, including videos, static web pages, and interactive previews. The resources found for most sections of the test cover both Mac and Windows versions of software or access, and provide supplementary external materials for each task and for overall understanding of the section. The portion of the guide that focuses on web programming (HTML and CSS), relies more heavily on outside resources. The website W3Schools is currently widely used and respected for a

variety of different technology skills, including HTML and CSS (W3Schools).
For that portion of the guide, each task is described generally with any necessary syntax or tags, followed by a link to a corresponding W3Schools page to learn about the topic more thoroughly. This approach was chosen as not to reproduce similar materials for students, since there is value in directing students to existing resources that produce high-quality content.

Design the Website

I designed the site in the UNC-Chapel Hill instance of WordPress (web.unc.edu) because it has features that make it the best option for a web resource based at UNC-Chapel Hill. Firstly, since it is an institutional account, it is foundationally linked to the University and not to any individual. The accounts are shared so that it can be edited by others, including future collaborators and administrators. While web.unc.edu requires an institutional account to edit, there is not any kind of log-in or account necessary to view the site. The guide is freely accessible to anyone with the link, making it simpler for incoming students. WordPress also already has features that promote general accessibility which makes it simpler to include features to make the site more readable and accessible, such as embedded alt tags and videos. Within this platform, I designed a template lesson and the overall structure of the site that was filled with content unique to each lesson.

Plan Lessons

The final step was to design each lesson, integrate external resources, and create each section of the test in the site itself. Here, “lesson” refers to the portion of the site that teaches a particular portion of the content. These lessons consist of a series of pages on the website that walk users through concepts, activities, and external resources that have

additional information. I developed lessons based on the requirements of the test and considered the recommendations from my research collaborator concerning the balance of relative accessibility and equity merits of external resources.

Each lesson was divided up to match the skills required on the test. Each set of tasks relating to a program or skill takes several elements to complete, so the lesson is divided into sections that provide the context and step-by-step instructions necessary. Each page of the module begins with a section titled "What do I need to know?" that gives an overview of the skills required to complete the corresponding section of the test. Then, there are resources for getting started in the section, including a definition of the tool, vocabulary, and how to choose or download the program. The main section of each page is the "How to…" portion which is broken into sub-sections that address individual skills for the tested area. For example, the test requires students to format a text document, so the "How to…" section of the "Documents" page includes sections for changing the font, aligning text, using headings, and more. A task on the test may require several separate tasks to complete, so the "How to…" section uses examples and step-by-step instructions to demonstrate how to do each part. If appropriate, these step-by-step guides are followed by resources to learn more or get a different perspective on the task. The final part of each page is an expanded resources section that gives a list of text and image tutorials, video tutorials, and places to practice with interactive tutorials.

The step-by-step processes modeled in the guide show examples that are similar, but not identical, to the test questions. The goal of showing how to complete each task is not to give the students the answers to the test, but to give them a detailed tutorial for each step of the test's questions. In some cases, there were no direct tutorials or

instructions available, so each section of the guide is different and tailored to the needs of that specific tool. For example, the section on databases is typically completed with Microsoft Access, which is only available on Windows computers. The guide attempts not only to point students towards Microsoft Access tutorials, but also make it clear how to access the software through the SILS virtual lab or a public computer lab if it isn't available on your computer. Each section has a unique approach, though every section is modeled in the same format has the same general elements.

An additional element of the guide is the main page of the site, which lists out the requirements for the test, its purpose, and the way that you would submit a response. Part of the confusion surrounding the test seems to be about the parameters of taking it and how to access the resources necessary. While the page listing requirements doesn't say anything new or different from the SILS site, it tried to lay out the information in an alternate way so that students can take in the processes again. The underlying approach of the guide is to be as clear and transparent as possible both in reference to the test and to the tools required to pass it.

Resources and Timeline

The resources necessary for this project are all freely available on the internet or provided by UNC-Chapel Hill. One of the underlying purposes of the website is to expose students to different kinds of openly available online resources that will be useful to them, so using paid materials may conflict with that goal. The exceptions to this general rule are for software and sites that have paid access that this provided for all UNC-Chapel Hill students. For example, the Microsoft Office suite is a paid product, but the software is provided to UNC-Chapel Hill students for free. Similarly, LinkedIn

Learning provides video tutorials, but requires a paid subscription that is covered by the University for students. Using this software and these tools are not only valuable to pass the test, they also show incoming students the services and software that they have access to as students at UNC-Chapel Hill.

The initial creation of the guide for this project was an eight-month process, completed in stages each lasting approximately two months. The pre-implementation stage consisted of writing the proposal, forming collaborations, and documenting existing work. The next stage was used to find resources and strategize the lessons to be included. The design and implementation process followed with lesson population, initial design, and a focus on accessibility. The final stage finished the project by continuing to iterate on the design with a focus on accessibility and readability, confirming the final deliverables with collaborators, reflecting on the work completed, and determining the next steps.

Sustainability

Technology is constantly evolving, and information professionals must evolve with it. While this guide strives to meet the current information technology competencies tested by SILS, it is inevitable that those competencies and the test itself will change. To recognize that impermanence, several measures are in place to protect against the guide remaining active on the internet after it has become obsolete. The first is that I have a vested interest in the project and its continued usefulness, so I have planned to contact the SILS administration in five years to ask about the status of the project. If it remains in the same state in 2025 as it is currently in 2020, then I will request that it be taken down.

However, I hope that this project continues to grow and change as the technology changes. The website includes a section about the guide itself, including encouragement for other interested master's students to take on parts of the guide as their own projects. This could include accessibility testing, a survey of users, online lesson planning, user experience testing and design, and more. If the guide is useful for students, then it must be updated and cared for in some manner. To facilitate this process of updating and changing the guide along with the test, access to the site has been provided for key administrators so that they will continue to have editing privileges on the site.

Project Goals

Final Deliverable

I created a WordPress site in web.unc.edu that contains the self-guided learning module focusing on teaching skills necessary to pass the Information Technology Competency Test at SILS (found at infotechstudyguide.web.unc.edu). This final deliverable will assist future students coming into the program and taking the test.

Project Goals

The overarching goal was to create an online learning module that allows students to teach themselves concepts and skills related to information technology. Within that, there are several other aspirations that directly relate to the final deliverable. My hope was to lower the barrier to entry for students to teach themselves technology and inspire confidence in their ability to utilize technology in their work. The concepts tested on the Information Technology Competency Test are the basis for many of the skills taught at SILS, and creating an easier way to learn those foundational concepts is a way to empower students to feel capable of building on what they already know. It is commonly acknowledged that when it comes to digital skills, one doesn't need to know all of the answers; the true skill is asking the right questions and knowing where to look up the answer. This project hopes to give students some of the resources to search for their own answers and practice making their own path to self-guided learning.

Another underlying goal of the project is to provide students with more agency and options as they enter SILS. Some students choose to take the in-person class because they know it will be helpful for them, but others may be in the class because they felt as if they couldn't pass the test. I would like for this guide to help demystify the technology and the test by streamlining the process of teaching oneself the skills tested. I believe that if students know that there is a support system at SILS to help them, more incoming master's students will be able to pass the test and continue their education with increased confidence. This may also be an opportunity to reach students who do not feel as if technology is "for them" or may believe that it is not relevant for what they want to do in their careers. With such a techno-pervasive field, digital literacy is in every job in some capacity, and there is no reason for anyone to be excluded. Integrating technology even before classes begin helps students see themselves as capable of using and teaching themselves new concepts, especially digital.

Overall, my goal for this project was to create a tool that would give students the agency to teach themselves new technology skills to prepare themselves for the SILS master's program. Even if students do not expect to work directly with technology again, the goal of this module is to allow them to guide themselves through this specific test in order to waive the class.

Potential Impact

This project has the potential to impact all incoming SILS students, especially those who are not entering the master's program with prior technological experience. It could influence the confidence of incoming master's students to tackle graduate level technology needs and also decrease the need for the INLS 161 class. If the guide is

extremely effective and allows most graduate students to test out of the class, then graduate enrollment for that course would decrease, allowing the class to focus on undergraduate needs. This would also allow the school to offer fewer of these courses, and could bring up an important reassessment of the information technology requirement. In an ideal case, this guide would empower students to learn technology skills for their own projects as well as for the test and help those students not feel as if they aren't capable of using technology for their purposes in school or life.

Project Evaluation

The final deliverable from this project was a completed learning module, hosted on web.unc.edu, that covers all of the elements on the test in the most accessible, readable, and diverse manner possible for our team to create. I met my original plan of having at least one external resource for each portion of the test, personalized instructions for each lesson, and I collaborated with UNC's Digital Accessibility Office to make the site as accessible as possible to students. With all of this in mind, and the hope that this version of the site will continue to be updated and improved, it can be included in the official SILS resources for the test.

Resource Evaluation

External resources included in the site were evaluated for content and accessibility practices. The decision was based on the recommendations given by the coordinating research project focusing on IDEA evaluation frameworks and the availability of alternate resources. In some cases, there were a limited number of high-quality resources to direct to, so the best were chosen, noting the limitations of these sites and the information they provide. The resources chosen are not endorsed by UNC SILS, and since the internet is impermanent, I recognize that there is no guarantee of their lasting quality.

Guide Evaluation

The guide itself was evaluated in terms of the development and initial publication of the site, though there will continue to be room for updating and improvement after the course of this project. There are several long-term methods for collecting data for analysis of the overarching success of the project. I may not be directly involved in post-development assessment, but I have set up the framework for evaluation metrics within the test itself. There is the potential to run plug-ins on the site to collect analytics data, provided the tool is chosen thoughtfully to prioritize user privacy. I also included a feedback form in the guide itself that users can opt to complete as they finish the test or site. This will provide more specific data about how people felt about using the guide, not just whether they visited it or not. It may also allow future developers to hear personal narratives from users that could shape the way the test is designed, the guide is evaluated, or how the project continues to iterate. Evaluative measures may take the form of a data-driven comparison between previous classes of SILS student who entered the school and took the test, including how many students take the INLS 161 class, how many pass the test on the first try, and how quickly test submissions were received.

Other evaluation techniques for future work could be focused on user testing to find levels of satisfaction and usability. This could include targeted testing with students with disabilities, especially visual or physical limitations, and readability tests with students for whom English is not their first language. Future stakeholders may also take a sample from the full SILS student body to test the navigation, structure, and contents of the site from a wide variety of SILS students with varied levels of digital literacy.

The goal of the guide is to allow students to teach themselves at their own pace and provide clear resources to help them pass the test. Embedding opportunities for feedback and finding data on current student use of the guide, both through comparing data to past classes of students and through user testing, will allow the guide to continue to improve to meet student needs.

Risks and Limitations

Limitations

This project could have included several phases, evaluations, and iterations, but because of time limitations, it was restricted to include only the initial development of the site. Within eight months, I completed full development and evaluation of the resources I used, but any further testing and iterating will be part of future work.

In this vein, I was not able to complete an environmental scan of the population affected, the school, the test itself, or the issues surrounding teaching technology remotely. The information used to shape the direction of the guide is drawn from publicly available information about the test requirements, my personal experience with the test, my work in classes at SILS, and general criteria for biases in education. I recognize that this combination of sources may not fully represent the needs of every student in SILS and therefore may not be as fully inclusive as I would hope. Site users may assume that I have conducted interviews or performed a direct assessment of the population, but I have decided not to include that in this project due to our limited scope and timeframe. I have experienced the environment first-hand by taking the test before entering SILS, and I am familiar with the population of SILS students as both as a peer and as a student myself. This familiarity with attitudes towards the test, the contents and preparation involved in the test, and the requirements from the school served as my background information in the place of a full environmental scan. I further recognize that using my own experiences

to drive design and development may introduce bias into the guide to shape it more closely to my needs than the needs of the general student body. I am aware of this issue and have attempted to be continually conscious of my own biases and background experiences as they pertain to the development of the test so that I can remain as neutral as possible. While a more formalized survey of the population's needs would be ideal, it wasn't feasible to complete both a scan and the project in the allotted time.

In future projects, I hope that the teaching module can be put through several variations of usability, accessibility, and general user testing to better tailor the guide to the needs of SILS students. In an ideal development module, the guide would be tested before launching, but in order to complete the project that was not possible. My research partner's guidelines for evaluating the individual resources in terms of readability, accessibility, and accommodating different learning approaches were useful for the first development for the guide and could be used to further develop user experience testing since they served in the interim as guidelines for making the guide as usable as possible. Changes would be made to the guide after these tests and continue to evolve over time. Unfortunately, due to time constraints, this version of the project was completed after the first round of development.

For the test itself, the contents were decided by the SILS faculty and staff, and I decided not to challenge or question the contents of the test to keep this project within scope. Even with recommended changes, there was not time or capacity to implement those suggestions. I hope that this project brings the test itself into view of the administration so that they can consider any changes they see fit.

Overall for this project, I have assumed that most students have enough computer literacy to navigate to the test on the SILS website and find this guide linked there. In order to be used, the guide must be visible on the SILS website and would require students to seek out materials for test preparation and be able to access the site I created. To mitigate this potential restriction, the link to the guided module will be on the same page as the test itself. This way, if a student is able and willing to seek out the test itself, they would also be able to see that there are resources available to them.

Risks and Ethical Concerns

There are few risks associated with this project because the final deliverable does not directly rely on any individuals, and is entirely optional. As noted, within development there is the potential for my personal experience with the test to inform my creation of the guide to the point of excluding those who will approach the test with a different set of experiences. This may lead to isolated feelings or imposter syndrome in those who do not feel that the guide is made for their purposes. There is also potential for students who are not able to access all of the materials to be put in a similar situation of frustration and perceived inability to complete the test.

If the test has negative impacts, SILS may be associated with these negative effects and suffer an increase of enrollment in the class covering the materials, an increase in students unsure about their technology competency, or an increase in general school dissatisfaction. In this case, SILS students may suffer from feelings of incompetency with technology and steer their career paths away from technology-heavy areas.

To combat these potential risks, I have incorporated my research partner's research on equity and inclusion into the creation of my guide and taken her recommendations regarding the resources selected. I have also done my own research into creating accessible and welcoming web-based learning objects so that my guide is as inclusive as possible, and have tried to separate my own experience and implicit biases from the development of the lessons.

I am invested in this project because I am a student at SILS who has taken and passed the Information Technology Competency test, but this does not represent a direct conflict of interest. I was intimidated by the preparation for the test, and considered opting for the class even though I knew how to complete the majority of the skills required. In order to complete my test, I used materials I had previously worked with in computer science courses, online guides, and previous familiarity with the topics; I would now like to share those tools. The high barrier of entry for finding information about the test and how to pass it motivated me to make the process easier for future students, and I strove to work objectively and fairly to create a guide for all.

Conclusion

This project attempts to lower the barrier to entry for students teaching themselves technology skills by creating a self-guided online learning module to teach incoming master's students at UNC-Chapel Hill SILS the skills necessary to meet the Information Technology Competency Requirement. The resources included on the test were evaluated with the recommendations resulting from the coordinating research project in mind concerning the readability, accessibility, and learning approaches in context to address a complex and diverse audience. Using these evaluations for individual resources and also for the guide as a whole, I worked to create an equitable and accessible resources that can be used by all SILS students to assist with the test requirements.

This work could be continued by conducting long-term evaluation processes for usability and effectiveness. An in-depth user experience study would improve the general use of the site, and the specific contents would be reassessed according to comparison between current incoming students and past students who took the test. In the future, technology competencies will continue to change, and at some point, future work could include working with stakeholders and administration to reevaluate what technology skills are tested on the Information Technology Competency Test itself.

The design and implementation process covered the skill-based instruction, design of distance learning, and facilitation of self-guided technology education for future students in Information and Library Science at UNC-Chapel Hill.

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